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MOF@IL composite materials as Pd(II) supports for heterogeneous organocatalytic reactions

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Metal-Organic Frameworks (MOFs) have experienced a rapid emergence in the last two decades because they offer unique advantages for many applications due to their ordered structures, high thermal stability, tunable chemical functionality, ultra-high porosity and the availability of hundreds of well characterized structures.[1] Among the properties that they may present, they have shown interesting activity as heterogeneous catalysts.[2] Additionally, MOFs could be excellent supports for active catalytic species, due to their porous nature, in order to obtain heterogeneous and reusable catalysts,[3] providing superb opportunities to tackle with reactions that requires more than one type of active centre.[4] In order to obtain heterometallic catalyst we have immobilized Pd(II) into the pores of the well studied Cu₃BTC₂ MOF (BTC= benzene-1,3,5-tricarboxylate) with the help of imidazolium derivated ionic liquids (IL). The preparation of the catalyst was made in two steps. Firstly, the Cu₃BTC₂ was charged with [BMIM][BF₄] ionic liquid (BMIM= 1-Butyl-3-methylimidazolium). Then, the insertion of palladium was made in basic media by the formation of a Pd organometallic complex with the N-heterocyclic carbene from the IL. The material was tested as heterogeneous catalyst for several organocatalytic reactions such as Suzuki-Miyaura and Sonogashira cross-coupling reactions, amine alkylation... The different conversion and selectivity results obtained for each type of reaction have allowed analyzing what is the role of each of the metals (Cu and Pd) in each reaction.

References:

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Biography

Edurne S. Larrea received her PhD in 2009 from the University of the Basque Country (UPV/EHU), where now is a postdoctoral research associate to the Crystallography Group. Her thesis was focused on the search of open inorganic-organic compounds based on vanadate oxoanion. She has specialized on the study of the catalytic properties of inorganic-organic materials. During her postdoctoral stage, she has studied heterometallic MOF materials, and focused on how to obtain porous crystal frameworks with open metal sites for enhanced catalytic activity. She has published 23 articles in JCR journals and more than 25 contributions to international conferences.